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The Effectiveness of the Kangaroo Mother Care Method on the Weight Gain and Body Temperature of Low Birth Weight Infants

Diyan Dwi Retno[1], Erlina Suci Astuti[2], Tri Nataliswati[3], Nurul Pujiastuti[4] (CA)
[1,2,3,4]Departementof Nursing,Politeknik Kesehatan Kemenkes Malang
Correspondence author's email (CA): nurul_pujiastuti@poltekkes-malang.ac.id

Abstract
Low birth weight babies are prone to hypothermia and weight loss. Hypothermia in low birth weight babies can be treated using one of the techniques, namely kangaroo mother care. A literature review was conducted to see the effectiveness of kangaroo mother care on increasing body weight and body temperature of low birth weight babies. The literature review research method uses five search databases (PubMed, ScienceDirect, ResearchGate, Garuda, Google Scholar) with keywords and operator booleans adjusted Medical Subject Heading (MeSH) for journal searches with a minimum of 2014-2021 publication. The journal results are selected according to the PICOS framework using the JBI Critical Apraisal tools. From 12 literature journals, 5 journals discussed BBLR weight gain, 4 journals discussed increasing body temperature and 3 journals discussed BBLR body weight and body temperature. Kangaroo mother care has effectiveness in increasing the body weight and body temperature of low birth weight babies.
Keywords: *Body temperature; low birth weight baby; kangaroo mother care method; weigh*

INTRODUCTION

Infants with Low Birth Weight (LBW) are born weighing less than 2500 grams, making them prone to both temperature and weight loss. The decline in their body temperature is linked to their limited ability to regulate temperature and their thin reserves of brown fat, increasing the risk of hypothermia and subsequent metabolic failure, potentially leading to mortality. Insufficient weight gain is a result of the underdeveloped sucking and swallowing reflexes in these infants, posing a challenge in receiving adequate nutrition. World Health Organization (WHO) data highlights the significant contribution of LBW infants to neonatal mortality. Tackling the concern of Low Birth Weight is a critical health issue that calls for immediate preventive measures. (Ferinawati & Sari, 2020).

Globally, the prevalence of Low Birth Weight (LBW) is estimated to be around 15% to 20% among 20 million births, with the majority (approximately 96.5%) occurring in developing countries (Ferinawati & Sari, 2020). Data from the 2018 RISKESDAS report on toddler weighing results reveals that 6.2% of newborns out of the total 56.6% had Low Birth Weight (BBLR) issues. In East Java, the birth data for the year 2019 shows 566,300 live births, with 39,739 infants (7.1%) facing challenges related to Low Birth Weight (BBLR). Neonatal mortality, occurring within the first 28 days, accounts for 35.3% of deaths, with infants affected by BBLR (TIM Penyusun Kementerian Kesehatan RI, 2020). Indonesia's infant mortality rate remains elevated compared to other ASEAN countries, standing at 27 per 1000 live births (Fatimah, 2015, as referenced in Dhilon & Fitri, 2019).

Infants with Low Birth Weight (LBW) may experience challenges in adjusting to a new environmental temperature, regardless of whether they are born at full or preterm gestational ages. As suggested by Nugraeny, *et al* (2020), LBW infants face difficulties adapting due to a lack of brown adipose tissue, commonly known as brown fat, which makes them highly sensitive to changes in temperature. Hypothermia, characterized by a reduction in body temperature below the minimal range, can occur in newborns when their temperature drops below 36.5°C. This condition is more likely to happen in low ambient temperatures when efforts to maintain the infant's body temperature are not effectively implemented. Hypothermia is a critical and emergent condition that demands immediate attention. Without prompt intervention, infants may be at risk of mortality due to respiratory and circulatory disruptions. LBW infants who survive this critical period remain susceptible to diseases or sepsis into adulthood. Furthermore, adults with a history of LBW face an increased risk of degenerative diseases, imposing economic burdens on both individuals and society.

Infants with Low Birth Weight (LBW) demand careful consideration due to their susceptibility to hypothermia and the incomplete development of their organs, increasing the risk of mortality (Rahfiluddin, 2017, as referenced in Ferinawati & Sari, 2020). According to the Ministry of Health of the Republic of Indonesia's Task Force (TIM Penyusun Kementerian Kesehatan RI, 2020), uncomplicated Low Birth Weight (LBW) infants can catch up on weight as they grow older. LBW infants often require care in an incubator to assist in regulating their body temperature. Incubator care involves substantial costs, and if the infant is born into a family with low economic status, it becomes challenging to afford such care. Given these challenges, an alternative method to support the survival of LBW infants has been identified, known as Kangaroo Mother Care (KMC) or Perawatan Metode Kanguru (PMK). According to Gavhane, *et al* (2016), Kangaroo Mother Care (KMC) serves as a substitute for an incubator in maintaining the body temperature of Low Birth Weight (LBW) infants. The KMC method is implemented based on the principle of skin-to-skin contact between a parent, particularly the mother, and the infant.

The researchers express an interest in undertaking a Literature Review to explore outcomes associated with the "Efficacy of Kangaroo Mother Care (KMC) on Weight Gain and Body Temperature among Low Birth Weight (LBW) Infants." The objective of this study is to deepen insights into the effectiveness of Kangaroo Mother Care in facilitating improvements in both body temperature and weight gain for LBW infants.

METHODS

This study employs a literature review method using research journals published between 2014 and 2021. Journal searches were conducted across five databases (PubMed, ScienceDirect, ResearchGate, Garuda, Google Scholar), starting from October 16, 2021. The inclusion criteria for selecting journals were

determined based on the PICOS framework (P: Low Birth Weight Infants in Hospitals, I: Implementation of Kangaroo Mother Care, C: Journals with topics related to intermittent or continuous Kangaroo Mother Care, O: Journals on KMC with outcomes showing increased weight gain and body temperature in LBW infants, S: Case Control Study, Cohort study, Randomized Control Trial, Quasi-Experiment). The search used keywords adapted to Medical Subject Heading (MeSH) terms, including intrauterine growth restriction, multiparity, preterm birth, premature birth, low-birth-weight infant, and kangaroo mother care or kangaroo mother care method.

The researcher identified 410 journals from the five databases. Subsequently, a selection process was carried out using EndNote to check for duplications, inclusion and exclusion criteria, and journals containing only titles and abstracts, which were then excluded from the literature criteria. Through this sorting process, 10 duplicated journals were identified, and 83 journals did not pass the title and abstract screening due to non-compliance with the criteria. Out of 317 full-text journals, only 12 met the PICOS criteria, as well as the inclusion and exclusion criteria. Next, the research findings were analyzed using The Joanna Briggs Institute (JBI) Critical Appraisal, with a cutoff point set at 50% for the critical appraisal criteria. Subsequently, the 12 eligible studies were included in the inclusion criteria and were ready for data synthesis.

RESULTS AND DISCUSSION

The journal search yielded 12 articles that met the predefined inclusion criteria. These articles were distributed among five researchers, with four researchers focusing on weight gain in Low Birth Weight (LBW) infants in their respective journals, another four researchers examining the increase in body temperature during Kangaroo Mother Care (KMC) treatment for LBW infants, and three other researchers discussing both weight gain and body temperature in LBW infants during KMC in their respective journals. Subsequently, a comprehensive review was conducted to obtain the results:

The Effectiveness of Kangaroo Mother Care on Weight Gain in Low Birth Weight Infants (LBW)

There is evidence indicating the effectiveness of Kangaroo Mother Care (KMC) in improving the weight gain of Low Birth Weight Infants (LBW), as observed in the literature review analysis of 8 journals (Rosita & Sri Nala, 2016; Fatimah, 2018; Dhilon & Fitri, 2019; Siagian et al., 2021; Riskawati et al., 2020; Acharya et al., 2014; Rahman, 2017). The group receiving KMC treatment showed a significant impact on better weight gain compared to the group not receiving KMC treatment. The effect of weight gain in KMC treatment varies due to differences in the duration of treatment days and treatment duration. The most effective KMC treatment in increasing the weight of LBW infants was conducted for 10 days, with the optimal treatment duration ranging from two to 12 hours per day.

The findings of this study align with the theory proposed by Herawati & Anggraini (2020), which states that Kangaroo Mother Care (KMC) is a therapeutic intervention that can lead to weight gain through increased bonding

between the mother and the infant. The observed weight gain differences based on varying treatment durations also correspond with the theory presented by Arifah & Wahyuni (2013), asserting that the longer KMC is performed, the more significant the weight gain becomes. The documented weight gain, as analyzed in the eight journals, is consistent with the theory put forth by Yuliana (2020), emphasizing the significant role of the Kangaroo Mother Care method in enhancing the weight of Low Birth Weight Infants (LBW). This is attributed to the direct breastfeeding from the mother, facilitating direct skin-to-skin contact between the mother and the infant, thereby maintaining the infant's body temperature and resulting in weight gain.

The researcher can conclude that Kangaroo Mother Care (KMC) has proven to be effective in increasing the weight of Low Birth Weight Infants (LBW), and longer treatment durations result in better weight gain outcomes. KMC involves attaching the infant to the mother's chest using the skin-to-skin principle, creating a more comfortable environment for the baby and facilitating a stronger bond between the mother and the infant. The implementation of KMC enables the infant to adapt easily to the external environment and facilitates substantial weight gain.

The Effectiveness of Kangaroo Mother Care on Body Temperature Increase in Low Birth Weight Infants (LBW)

The findings of the literature review conducted on 7 inclusive journals (Bera et al., 2014; Heriyeni, 2018; Parti et al. 2020; El-Farrash et al., 2019; Acharya et al., 2014; Rahman, 2017; Margekar et al., 2021) indicate the effectiveness of Kangaroo Mother Care (KMC) in increasing and stabilizing the body temperature of Low Birth Weight Infants (LBW). The increase in body temperature during KMC treatment can range from 0.18°C to 2.8°C, with daily treatment lasting from three to six days, and the duration of KMC ranging from a minimum of one hour to more than six hours per day. In addition to improving and stabilizing the body temperature of LBW infants, KMC also has a preventive effect against hypothermia. According to two literature review journals in the table, KMC is capable of reducing the incidence of hypothermia by 10% to 30%.

The results of this literature review align with the theory of benefits presented in the maternal and child health textbook by the Health Education and Training Center (Pusat Pendidikan dan Pelatihan Tenaga Kesehatan, 2015). It states that Kangaroo Mother Care (KMC) is beneficial for temperature stabilization, ensuring the quick warming of the baby, and maintaining warmth (thermoregulation) within the range of 36.5–37.5ºC. Another theory, as discussed by Herawati & Anggraini (2020), suggests that prolonged touch between the mother and baby can reduce the release of catecholamines in the blood, thereby lowering the physiological stress of the fetus. Additionally, it can aid in the physiological adaptation of the baby to the external world, prevent hypothermia, reduce infant restlessness, and lead to longer sleep durations, ultimately impacting the stimulation of the baby's growth and development. The theory put forward by Hendayani (2019) emphasizes that direct skin-to-skin contact between the baby and mother causes the mother's body heat to warm the baby.

In the case of LBW infants, the baby absorbs the mother's body temperature directly through skin-to-skin contact, resulting in heat transfer from the mother's body to the baby through conduction, thereby keeping the baby's body temperature warm.

Kangaroo Mother Care (KMC) is a simple treatment that utilizes the natural skin temperature and the adaptive response of the mother and baby to increase the body temperature of Low Birth Weight Infants (LBW). KMC treatment offers satisfying outcomes in maintaining body temperature stability and preventing hypothermia in LBW infants. The researcher found that the skin-to-skin technique applied in KMC functions as a transmission of body heat by propagating the higher body temperature of the mother, which comes into contact with the lower-temperature skin of the baby, resulting in an increase in the baby's body temperature to a constant and normal level. This helps the baby avoid hypothermia. Another discovered outcome is the impact of the duration of Kangaroo Mother Care treatment on the obtained results. The longer the KMC treatment is administered, the better the outcomes in terms of maintaining body temperature and preventing hypothermia.

CONCLUSION

Based on the examination of literature review studies, Kangaroo Mother Care (KMC) proves to be effective in enhancing weight gain and elevating body temperature in Low Birth Weight (LBW) infants. The impact of KMC treatment is noteworthy, and the comparison between daily and hourly treatment durations plays a role in the observed improvements in LBW infants.

The scrutiny of weight gain publications reveals that the most extended daily treatment duration, carried out over 10 days with two 60-minute sessions per day, resulted in the most substantial weight gain of 448.0 grams. Similarly, the analysis of journals focusing on body temperature increase showed that a seven-day KMC treatment, with a treatment duration of 60 minutes versus 120 minutes, led to an increase of 0.43°C and 0.61°C. Furthermore, another outcome observed was the reduction in hypothermia incidents in LBW infants, with the most significant percentage decrease (31%) achieved with a six-hour treatment duration.

In summary, the outcomes derived from this literature review study imply that an extended duration of KMC treatment correlates with more favorable results in both weight gain and body temperature increase for LBW infants.

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